



5.3 City of Williamsburg Profile

The following sections present a detailed assessment of critical hazards that affect the City of Williamsburg. Understanding these hazards will assist the Peninsula region in its process of identifying specific risks and developing a mitigation strategy to address those risks.

5.3.1 Flooding – City of Williamsburg

As part of the NFIP, FEMA has created a Flood Insurance Study (FIS) and Flood Insurance Rate Maps (FIRMs) for the City of Williamsburg. In addition, the NCDC tracks the occurrence of flooding events for communities across the nation. These data sources and others were utilized in developing the hazard identification and vulnerability assessment.

The FIS for the City of Williamsburg was published March 2, 1994. The FIRMs, which accompany this FIS, delineate the 100- and 500-year flood hazard boundaries for flooding sources identified in areas of growing development or areas predicted to have future development, at the time of the report. A detailed study was conducted in order to delineate the 100- and 500-year flood hazard boundaries for the City. This analysis resulted in a 100-year stillwater elevation of 8.5 feet for most of the City. The significant flood events outlined in the FIS are given below in Table 5.3.1a, although specific reference to flooding or damage in Williamsburg in the FIS is scarce.

Table 5.3.1a -Significant Flood Events – City of Williamsburg

Date	Storm	Tide Elevations
August 1933	Hurricane	Max tide heights averaged 8 feet
April 1956	Nor'easter	Not given
October 1957	Hurricane – Not Named	Not given
September 1960	Hurricane Donna	Not given
March 1962	Nor'easter	Max tide heights averaged 6.8 feet

Source: FEMA 1994

The NCDC, operated by NOAA, also keeps a record of significant weather related events and damage estimates for the entire country. Listed below (Table 5.3.1b) is the significant event that affected the City of Williamsburg.

Table 5.3.1b- NCDC Listed Significant Flood Event –City of Williamsburg

Date	Event	Precipitation	Comments
September 15 to 17, 1999	Hurricane Floyd	12 to 18 inches	▪ Road flooding and landslides

Community officials indicate that there have been two additional and significant flood events in Williamsburg that were not included in the FIS or the NCDC databases. In June 1963, excessively heavy rains caused the original Waller Mill Dam to break, damaging homes and infrastructure in Williamsburg. The 270-foot dam was rebuilt, and currently retains a 343-acre reservoir. The second flood event occurred on August 18, 1989 when a remarkable rain cell unloaded 12 inches of precipitation on the City, flooding City Hall.



5.3.2 Hurricanes – City of Williamsburg

The FIS for the City of Williamsburg identified three historic hurricanes that affected the City (see Table 5.3.1a above); however, specific damage details are not provided. The NCDC dataset listed seven hurricanes for the City of Williamsburg for the period 1950 to June 2004. These storms are listed in Table 5.3.2. An obvious disconnect between the data sources is evident. The NCDC database covers the past 50 years, but only cites storms since 1995 and omits major hurricanes, such as Donna (1960), which are cited in the FIS.

Hurricane Floyd moved through the area dropping several inches of rain within 24 hours and generating winds in excess of 40 mph. Lower James City County reported 12.83 total inches of rain for the storm. In Williamsburg, the primary damage was from road flooding and landslides.

Hurricane Isabel made landfall on September 18, 2003 as a Category 2 hurricane near Drum Inlet, North Carolina. Hurricane Isabel is considered to be one of the most significant tropical cyclones to hit this area since Hurricane Hazel (1954) and the Chesapeake-Potomac hurricane of 1933 (Hazel is not included on either the NCDC or FIS data sets, but has been identified locally by the PHMPC). Isabel produced storm surges six to eight feet above normal high tide levels and is directly responsible for 10 deaths in Virginia and indirectly responsible for 22 deaths. Isabel caused wide spread wind and storm surge damage in eastern North Carolina and southeastern Virginia, currently estimated at \$925 million in Virginia. All of the above data was taken from the NOAA Tropical Cyclone Report for Hurricane Isabel (Beven and Cobb, 2004).

During the 2004 hurricane season, five separate tropical cyclones (Charley, Frances, Ivan, Jeanne, and Gaston) of varying magnitude hit the eastern and Gulf coasts of the United States. Although the damage from these storms to the Peninsula region was minor, the occurrence of significant multiple events over a few weeks highlights the vulnerability of the planning area to these storms, and infers the disruption that they create (Table 5.3.2).

Table 5.3.2- Historic Hurricanes – City of Williamsburg

Date	Storm Name	Category	Descriptions
August 15, 1995	Felix	Not given	<ul style="list-style-type: none"> No major damage reported in VA Tides 2.0-2.5 feet above normal
July 12, 1996	Hurricane	Not Given	<ul style="list-style-type: none"> None given
September 1, 1999	Dennis	Hurricane/Tropical Storm	<ul style="list-style-type: none"> Prolonged period of tropical cyclone Generated a F2 tornado Tide 3 feet above normal Coastal flooding 2 to 5 inches of rain \$27,000 damage
September 15, 1999	Hurricane Floyd	Category 1	<ul style="list-style-type: none"> Spawned 2 tornados Hundreds of downed tress Tide 3.9 feet above normal Numerous roads washed out \$99.4 million in property damage over the entire affected area
September 18, 2003	Hurricane Isabel	Category 1/Tropical Storm	<ul style="list-style-type: none"> Hundreds of downed tress Loss of power Damaged residents and businesses Greatest storm surge since Hazel
August 18, 2004	Charley	Hurricane	<ul style="list-style-type: none"> Highest sustained wind was 73 mph Uprooted of trees and downed numerous power lines Over 2 million Virginians without power Heavy rain and wind gust
September 8, 2004	Frances	Hurricane	<ul style="list-style-type: none"> Generated 9 tornados in Central Virginia High winds Large amounts of rainfall/flooding
September 17, 2004	Ivan	Hurricane	<ul style="list-style-type: none"> Spawned unconfirmed tornados Power outage (66,000) Heavy rain/flooding
September 28, 2004	Jeanne	Hurricane	<ul style="list-style-type: none"> Flash flooding/heavy rainfall Power outage
August 30, 2004	Gaston	Tropical Depression	<ul style="list-style-type: none"> Hard rains that processed flooding Roads under water Power outage (99,600 statewide)

5.3.3 Tornados – City of Williamsburg

The City of Williamsburg has experienced three recorded tornados between 1896 to 1999 (Table 5.3.3) that caused damage. The most significant tornado occurred on October 14, 1986, which generated wind of 110 mph and caused \$1.8 million in damages the entire affected area.

Table 5.3.3- Historic Tornados – City of Williamsburg

Date	Magnitude	Deaths	Injuries	Descriptions
July 8, 1896	Not Given	Not Given	2-5	<ul style="list-style-type: none"> Spawned by a hurricane Barns and small houses destroyed
May 8, 1984	Not Given	Not Given	Not Given	<ul style="list-style-type: none"> Spawned by sever thunderstorms Destroyed three mobile homes
October 14, 1986	F2	Not Given	Not Given	<ul style="list-style-type: none"> Downburst of 110mph Damages of \$1.8 million over entire affected area



5.3.4 Wildfire – City of Williamsburg

Many wildfires are caused by human acts, either intentional, such as arson or unintentionally. They can also be started by natural occurrences, such as lightning strikes. Wildfire danger can vary greatly from season to season and is often exacerbated by dry weather conditions. Because of wildfire risk, VDOF has produced Fire Risk Assessment Maps designed to help communities determine areas with the greatest vulnerability to wildfire.

The Wildfire Risk Assessment Map, Appendix B, delineates the aerial extent of wildfire vulnerability within the City of Williamsburg. Approximately 55 percent of the city is in a high wildfire risk area. Parameters used to establish these risk boundaries are land use, population density, slope, land cover and proximity to roads. The proximity of the tree lines or brush to the highway or roadway is also included in the wildfire risk analysis to capture the human/wildfire causal relationship. Travel corridors increase the probability of human presence, thereby increasing the probability of wildfire ignition. Thus, areas closer to roads are much more likely to attain a higher ignition probability.

Parts of the Peninsula region near Williamsburg are experiencing an accelerated development rate. Land that once was rural and relatively inaccessible is now either under development or planned for development. Although the clearing of land for development removes potential fuel sources for wildfire, the wildfire hazard is not necessarily diminished because human access to the area is significantly increased. This development trend expands the wildland/urban interface, by placing structures in close proximity to large amounts of vegetation, which in turn increases the risk of wildfire (NWUIFPP undated).

5.3.5 Vulnerability Assessment – City of Williamsburg

The PHMPC conducted a vulnerability analysis for each critical hazard that was identified as having a medium to high hazard potential of occurrence. As several of these hazards are prone to occur in any part of the city, the exposure associated with tornados and winter storms is assumed to include the entire city. This section describes the method used to perform the vulnerability analysis for each hazard and then lists the results.

Flooding – City of Williamsburg

The City's GIS consultant provided a building layer, which was overlaid with the City of Williamsburg FIRM. The two maps were compared to determine the number of buildings in the 100-year floodplain, as the results determined that no buildings were located within the 100-year floodplain of Williamsburg.

FEMA has developed a concept to highlight the impact that repetitively flooded structures have had on the NFIP. The term "repetitive loss," as applied to the NFIP, refers to any property for which two or more flood insurance claims in excess of \$1,000 each in a 10-year period of time have been paid. Including flood insurance claims paid as a result of flood damage caused by Hurricane Isabel in 2003, FEMA has identified no (zero) repetitive loss structures in the City of Williamsburg.



Hurricane – City of Williamsburg

Hazards U.S. – Multi Hazard (HAZUS^{®MH}) was utilized to perform a wind hazard analysis for the entire Peninsula region. HAZUS^{®MH} software is a multi-hazard loss estimation program that was developed under a cooperative agreement between the National Institute of Building Sciences and FEMA. The current version of HAZUS^{®MH} has the ability to calculate earthquake, wind, and flood hazards as well as potential economic losses associated with these hazards. The software is designed with the flexibility to perform loss estimations at three different levels. Level 1 utilizes all default parameters built into the software. Levels 2 and 3 require user defined scenarios and building inventory data. For the purpose of this Plan, a Level 1 wind analysis was performed to calculate the wind hazard for each Peninsula community. The probabilistic scenario activates a database of many thousands of storm tracks and intensities. This scenario generates hurricane hazards based on set return periods. These return periods define the statistical probability that a storm of a given size and intensity could occur within any year.

Table 5.3.5a lists the total dollar value of exposed structures for the City of Williamsburg to wind damage based on the 2002 Census data.

Table 5.3.5a- Value of Exposed Structures from HAZUS^{®MH} – City of Williamsburg

Occupancy Type	Value of Exposed Structures (\$1,000)
Residential	727,908
Non-Residential	229,073
Total	956,981

The probabilistic analysis generated with the HAZUS^{®MH} software utilized the same building stock information listed above for the 1933 historic hurricane. The probabilistic scenario generates hurricane hazards based on set return periods. These return periods define the statistical probability that a storm of a given size and intensity could occur within any year. The probabilistic method was used to generate loss estimations of storms with specific recurrence intervals: 10-, 20-, 50-, 100-, 200-, 500-, and 1000-year. Since residential structures comprised a significantly large percentage of the occupancy classification these data are presented in Table 5.3.5b below.

Table 5.3.5b- Summary of Hurricane Probabilistic Analysis on Residential Structures – Williamsburg

Return Period	Residential Building Damage – Number of Buildings			
	Minor	Moderate	Severe	Destruction
10-year	5	0	0	0
20-year	21	1	0	0
50-year	106	9	1	0
100-year	17	1	0	0
200-year	719	255	14	5
500-year	922	712	98	46
1000-year	897	822	148	69

Tornado – City of Williamsburg

The facilities and building stock that were identified as exposed under hurricane hazards are also exposed to tornado hazards. Tornadoes are random natural events that strike with little warning but are associated with thunderstorms and hurricanes. No damage estimates have been created for tornadoes that might strike Williamsburg.

Wildfire – City of Williamsburg

The Wildfire Risk Assessment data, provided by the Virginia Department of Forestry, was used as a starting point to estimate the wildfire risk for the City of Williamsburg. This data layer was revised by City staff and incorporated into the all-hazard map (Appendix F). This data layer was overlaid with the City's tax parcel mapping in order to estimate the value of at risk structures. The VDOF also provided the number of wildfire incidence reported from 1995-2001.

According to the VDOF, no wildfires were reported in Williamsburg between 1995-2001. City staff provided the value of residential and commercial parcels that are at risk to wildfire. The values are based on the improvement values for residential and commercial parcels that intersect the high wildfire hazard areas. The analysis resulted in an at-risk value of \$14,582,700 for residential properties and \$9,304,700 for commercial properties.

Critical Facilities

The PHMPC also conducted an inventory of Williamsburg critical facilities (Appendix E). Critical facilities are those facilities that warrant special attention in preparing for a disaster and/or facilities that are of vital importance to maintaining citizen life, health, and safety during and/or directly after a disaster event. The inventory of critical facilities for the City of Williamsburg includes emergency response facilities such as police stations, fire departments, emergency medical service stations (EMS), public facilities including schools and local

government buildings (Table 5.3.5c). Those critical facilities that are geographically located within an identified hazard zone are listed below.

Table 5.3.5c-Critical Facilities at Risk – High Wildfire Hazard Zone

Name	Code	Number
Pump Station	PS	534
Pump Station	PS	536
Pump Station	PS	532

Source: AMEC

Critical Facility Key Code, see Appendix E

5.3.6 Capability Assessment – City of Williamsburg

As an additional tool to assist with the examination of the hazards identified and to evaluate the community's ability to plan, develop, and implement hazard mitigation activities, the planning team developed a local capability assessment for the City of Williamsburg. This assessment is designed to highlight both the codified, regulatory tools available to the community to assist with natural hazard mitigation as well as other community assets that may help facilitate the planning and implementation of natural hazard mitigation over time. The following Capability Assessment Matrix was used as a basis for the City of Williamsburg's mitigation plan.

Table 5.3.6 - Capability Matrix – City of Williamsburg

	City of Williamsburg
Comprehensive Plan	Yes
Land Use Plan	Yes
Subdivision Ordinance	Yes
Zoning Ordinance	Yes
Floodplain Management Ordinance	No – using Chesapeake Bay Preservation ordinance
-Effective Flood Insurance Rate Map Date	3-2-94
-Substantial Damage Language	No
-Certified Floodplain Manager	No
-Number of Floodprone Buildings	0
-Number of NFIP policies	29, as of 12/03
-Maintain Elevation Certificates	No
-Number of Repetitive Losses	0
CRS Rating	None
Stormwater Program	Yes
Building Code Version	VUSBC (IBC 2003)
Full-time Building Official	Yes
- Conduct "As-built" Inspections	Yes
- BCEGS Rating	2



	City of Williamsburg
Emergency Operations Plan	Yes
Hazard Mitigation Plan	Yes
Warning Systems in Place	Yes
-Storm Ready Certified	No
-Weather Radio Reception	Yes
-Outdoor Warning Sirens	Yes, just for Surry
-Emergency Notification (R-911)	No
-other (e.g., cable override)	Text alerts in public bldgs (w/James City County)
GIS system	under development
-Hazard Data	under development
-Building footprints	Yes
-Tied to Assessor data	Yes
-Land Use designations	under development
Structural Protection Projects	Yes
Property Owner Protection Projects	Yes
Critical Facilities Protected	Not fully
Natural Resources Inventory	Yes
Cultural Resources Inventory	Yes
Erosion Control Procedures	Yes
Sediment Control Procedures	Yes
Public Information Program/Outlet	Yes
Environmental Education Program	Yes

One highlight from the matrix is the existence of 29 NFIP policies, when there are no buildings within the 100-year floodplain. This suggests the City may be unaware of flooding or drainage issues.

Form of Governance

The Williamsburg City Council is composed of five members, elected at-large. The Council appoints the Mayor, Vice Mayor, City Manager, City Attorney and Clerk of Council. The Mayor chairs the City Council and acts as the official head of the City government. The City Manager administers the City government, carrying out the policies of City Council. The Council members serve four-year staggered terms, with elections held in May in even-numbered years.

Guiding Community Documents

The City of Williamsburg has a range of guidance documents and plans for each of their departments. These include a comprehensive plan and emergency management plans. The City uses building codes, zoning ordinances, subdivision ordinances, and various planning strategies to address how and where development occurs. One essential way the municipality guides its future is through policies laid out in the Comprehensive Plan.



Comprehensive Plan

The Code of Virginia requires all cities and counties in the state to have a comprehensive plan and to review it every five years to determine if it needs to be revised. The *1998 Comprehensive Plan* is the City's fifth plan, and will be updated in 2005. Although the *1953 Comprehensive Plan* was the first formal plan adopted under State law, the City's first plan in 1633 encouraged a new settlement at Middle Plantation with high ground, better drainage, good water and more central to the growing colony, out of the range of a ship's guns and less vulnerable to mosquitoes. The modern-day document features the following:

- The plan presents long-range intentions regarding the direction and nature of future development.
- Plan goals are grouped into seven general categories: environment, transportation, housing, land use, public services, economic development and implementation.
- Geographically, the plan is divided into 10 planning areas: Capitol Landing, Center City, Colonial Williamsburg, Courthouse, Midtown, Patriot, Richmond Road, Strawberry Plains, Wales, and the Entrance Corridors.
- The Open Space and Recreation element focuses on planned improvements to both active and passive parks at Capitol Landing, College Creek, Papermill Creek, Merrimac Trail, Quarterpath Park, Berkeley Park, and Waller Mill Park.
- Plans for continued growth and development and urban design in designated growth/redevelopment areas, including:
 - Riverside Hospital property holdings
 - High Street
- Plans for necessary transportation enhancements and improvements to service projected growth.

As a result of recommendations in the *1989 Comprehensive Plan*, a Listing of Significant Architecture and Areas in Williamsburg was created. The database is based on the results of a 1992 Architectural Survey. An Architectural Review Board (ARB) reviews development proposals for listed properties or properties in the vicinity of the Architectural Preservation District and Corridor Protection Districts. Design Review Guidelines transcribe the design review and community preservation goals used by the ARB. The latest Comprehensive Plan designates 301 acres as "museum support", or areas that are part of Colonial Williamsburg or the historic campus of the College of William and Mary. Colonial Williamsburg maintains a database with 88 of the historic structures within their preview.

Zoning & Development Standards

- Identifies existing federal and state regulations for wetland and RPA/RMA protection.
- The document outlines required standards for new development and redevelopment based on use and zoning designation.

FEMA Region III has determined that the City of Williamsburg has adopted the minimum requirements of the NFIP through adoption of their Chesapeake Bay Preservation Ordinance at Article VIII of the Zoning Ordinance. Williamsburg has adopted stringent RPA and RMA zones



with 100 feet and 500 feet buffers, respectively. The ordinance does not address new structural requirements (e.g., lowest floor elevation) and exempts remodeling or alterations to nonconforming principal structures, public utilities, railroads and other infrastructure, including water wells.

The FIRM indicates limited non-tidal floodplains exist along College Creek, Papermill Creek, Tutter's Neck Pond, and Queen Creek. The City's plan review, land disturbance and building permit applications do not contain any reference to flood hazards; however, the *Site Plan Checklist* mandates delineation of floodplain limits on the site plans.

A Technical Review Committee for new development is made up of representatives from Codes Compliance, Fire, Police, Public Works, and Planning.

Stormwater Program

Oversight for the City's drainage system is provided by the Department of Public Works, Engineering Division. Engineering staff review site and subdivision plans to ensure compliance with the City's ordinances, provide project management for the City's capital improvement program, and provide quality control on construction of public improvements. Site plans for large developments are required to incorporate a stormwater fee or stormwater utility to ensure long-term maintenance of the drainage improvements. The Department has assisted with installation of BMPs for several chronically-flooded intersections. Engineers are also available to assist citizens with questions on all aspects of Public Works and Utilities.

Public Education

Among the readily available public outreach mechanisms for the City of Williamsburg, the City's website (<http://www.ci.williamsburg.va.us/index.htm>) provides residents with pertinent information, a property information tool, and answers to numerous Frequently Asked Questions. The City also posts most of its guiding documents, including the Comprehensive Plan.

The Fire and Police Departments conduct numerous types of public outreach regarding crime and fire prevention, including a program for fourth-grade students regarding fire and all-hazard safety. The Emergency Preparedness web site contains sections promoting family disaster preparedness, and a Neighborhood Guide with action plans and other valuable information for Williamsburg's residents and visitors. City Hall maintains a display of pertinent brochures and disaster-related handouts.

Emergency Preparedness

Emergency Alert System (EAS) is a national civil emergency alert system that uses message relays between member radio and television stations to inform the public about immediate threats to national security, life, and property. EAS is now routinely used for severe weather warnings and can also be employed to disseminate Amber Alerts for missing children. The enhancement is an initiative of Governor Warner's Secure Virginia Panel designed to improve statewide preparedness, response, and recovery capabilities for emergencies and disasters. Governor Mark R. Warner announced June 5, 2004, that Virginia will enhance its public warning



capabilities with a new satellite-based system that can rapidly transmit EAS messages throughout the Commonwealth. WMBG 740AM provides public notifications for Williamsburg.

Community Emergency Response Teams – By summer 2006, the City plans to recruit, train, and deploy functioning Neighborhood Response Teams, trained through the Citizen Corps/CERT process, to assist with government response of natural and manmade disasters and emergencies. CERT helps communities respond to disasters during the first 72 hours following a disaster when flooded roads, disrupted communications, and emergency demand outweigh local emergency services. The purpose of CERT training is to provide private citizens with basic skills to handle virtually all of their own needs and then to respond to their community's needs in the aftermath of a disaster.

Other Mitigation Activities

Numerous best management practices (BMPs) have been implemented to alleviate chronic flooding in key intersections, including a redesigned drainage system along Richmond Road with larger culverts, and improved drainage at the Yankee Candle Factory. A dam break in 1988 resulted in a pond redesign within the City. Several private property owners have addressed problems with erosion control and mudslides on steep slopes, especially following the heavy precipitation associated with Hurricane Floyd.

Critical facility protection has been addressed through a Homeland Security Assessment, which notes the importance of Williamsburg as home to the "ideas of democracy." Electronic card access for the EOC was added to increase security during disasters and terror alerts. The reservoir and pump station were recently fenced. A mobile command unit for the EOC has been arranged to provide backup in the case of an event in central Williamsburg. The City's Property Information System is now backed up and maintained by a remote vendor with power backup. During and after Hurricane Isabel when power was unavailable, City officials had no access to the system because the remote vendor did not have power. The City also maintains a database of critical road intersections and has developed a plan to provide power backup to those intersections as necessary. The City's filter plant now has power backup and all pump stations will soon have generator back-up. During power outages, volunteer Ham radio operators are invited to the EOC to assist with communications.

Many special needs residents are addressed in State-mandated emergency plans for nursing homes. Backup power plans are incorporated into the plans, and emergency management officials meet quarterly with hospital and nursing home representatives to address planning issues. Williamsburg has added hospital and nursing home representatives to the EOC.

In cooperation with James City County, Williamsburg is installing text alerts for severe weather in public buildings, including school and libraries. Large digital readout boxes are installed, generally above prominent doorways, and can be programmed to display a particular warning or message. Rather than sharing shelters with James City County as in previous disasters; Williamsburg is developing a new shelter plan for their residents.